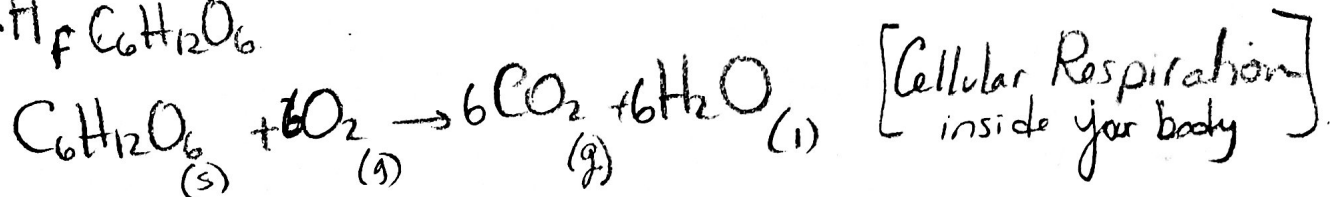


#1) $\Delta H_f^\circ \text{C}_6\text{H}_{12}\text{O}_6$



$$\Delta H_{\text{Comb}}^\circ = 6\Delta H_f^\circ \text{CO}_2(g) + 6\Delta H_f^\circ \text{H}_2\text{O}(l) - \Delta H_f^\circ \text{C}_6\text{H}_{12}\text{O}_6$$

$$-2803 \text{ kJ} = 6(-393.5) + 6(-285.8) - \Delta H_f^\circ \text{C}_6\text{H}_{12}\text{O}_6$$

$$-2803 = -2361 - 1714.8 - \Delta H_f^\circ \text{C}_6\text{H}_{12}\text{O}_6$$

$$-2803 + 2361 + 1714.8 = -\Delta H_f^\circ \text{C}_6\text{H}_{12}\text{O}_6$$

$$+1272.8 = -\Delta H_f^\circ \text{C}_6\text{H}_{12}\text{O}_6$$

$$\Delta H_f^\circ = -1272.8 \text{ kJ/mol}$$

#2) $\Delta H = 3\Delta H_f^\circ \text{CO}_2(g) - [\Delta H_f^\circ \text{Fe}_2\text{O}_3 + 3\Delta H_f^\circ \text{CO}(g)]$

$$= 3(-393.5) - (-824.2 + 3(-110.5))$$

$$= -1180.5 - (-1155.5)$$

$$= -1180.5 + 1155.5$$

$$= -25 \text{ kJ}$$

#4) $\Delta H^\circ = [\Delta H_f^\circ \text{CHCl}_3 + 3\Delta H_f^\circ \text{HCl}] - [\Delta H_f^\circ \text{CH}_4(g)]$

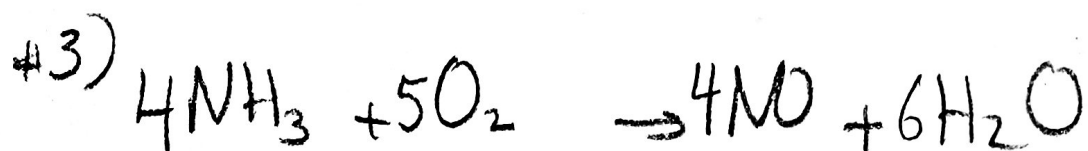
$$-305.0 \text{ kJ} = \Delta H_f^\circ \text{CHCl}_3 + 3(-92.3) - (-74.6)$$

$$-305.0 = \Delta H_f^\circ \text{CHCl}_3 - 276.9 + 74.6$$

$$-305.0 = \Delta H_f^\circ \text{CHCl}_3 - 202.3$$

$$-305.0 + 202.3 = \Delta H_f^\circ \text{CHCl}_3$$

$$-102.7 \text{ kJ/mol} = \Delta H_f^\circ \text{CHCl}_3$$



$$\begin{aligned}\Delta H &= (4 \Delta H_f^\circ \text{NO}_{(g)} + 6 \Delta H_f^\circ \text{H}_2\text{O}_{(g)}) - (4 \Delta H_f^\circ \text{NH}_3_{(g)}) \\ &= 4(+91.3) + 6(-241.8) - 4(-45.9) \\ &= 365.2 - 1450.8 + 183.6 \\ &= -902 \text{ kJ}\end{aligned}$$

Multistep

1. $5.48 \text{ g} \times \frac{1 \text{ mol}}{137.33 \text{ g}} = 0.03990 \text{ mol Ba}$

$$\frac{-21.9 \text{ kJ}}{0.03990 \text{ mol}} = -549 \text{ kJ/mol Ba}$$



2. a) $\Delta H = 4 \Delta H_f^\circ \text{Al}_2\text{O}_3 - [3 \Delta H_f^\circ \text{Fe}_3\text{O}_4]$

$$\begin{aligned}&= 4(-1675.7) - 3(-1118.4) \\ &= -6702.8 + 3355.2 \\ &= -3347.6 \text{ kJ}\end{aligned}$$

b) $\frac{1000 \text{ g}}{55.85 \text{ g/mol}} = 17.91 \text{ mol Fe}$

$$\frac{-3347.6 \text{ kJ}}{9 \text{ mol Fe}} = \frac{x \text{ kJ}}{17.91 \text{ mol}}$$

$$\begin{aligned}x &= -6660 \text{ kJ} \\ &= -7000 \text{ kJ}\end{aligned}$$

$$\begin{aligned} \#3) \quad \Delta H &= (\Delta H_f^\circ \text{CaO} + \Delta H_f^\circ \text{CO}_2(g)) - \Delta H_f^\circ \text{CaCO}_3(s) \\ &= -634.9 + (-393.5) - (-1207.6) \\ &= 179.2 \text{ kJ} \end{aligned}$$

$$\frac{179.2 \text{ kJ}}{1 \text{ mol CaCO}_3} = \frac{x \text{ kJ}}{4.9955 \text{ mol}} \Rightarrow x = 179.2 \times 4.9955 = 895.2 \text{ kJ} \approx 900 \text{ kJ}$$

$$\begin{array}{r} \text{CaCO}_3 = 40.08 \\ + 12.01 \\ + 3(16.00) \\ \hline 100.09 \text{ g/mol} \end{array}$$

$$\begin{array}{r} 500 \text{ g} \\ \hline 100.09 \text{ g/mol} \end{array}$$